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REVIEWS

Structural and Field Geology. By JAMES GEIKIE. New York: S. Van Nostrand Co. Pp. xx+435, 56 full-page plates, 142 illustrations in text.

The student whom Mr. Geikie seems to have had most prominently in mind, during the preparation of this work, is the prospective mining engineer. The book is an excellent handbook for those wishing to make some practical use of geology or to study the science from a practical standpoint.

The first five chapters deal with rock-forming minerals and rocks. In chap. vi the modes of preservation of organic remains in rocks are described, and the significance of fossils in geologic studies is briefly pointed out. Chap. vii treats of stratification, and chap. viii of concretionary and secretionary structures. There then follows a full and well-illustrated description, occupying the next four chapters, of the structures common to sedimentary rocks. The mode of occurrence and the structural relationships of eruptive rocks are treated in chaps. xiii and xiv. After the student has a knowledge of the chief materials of the earth, of the aggregation of these materials in the common rock formations, and of the attitudes and relationships of these formations, he is invited to consider the alteration and metamorphism of such materials and formations. Chap. xv is devoted to the consideration of such changes. In chaps. xvi and xvii ore formations are carefully figured and described.

The next three chapters, xviii–xx inclusive, are devoted to geological surveying, and chap. xxi to the preparation of geologic maps and sections. These four chapters include numerous practical suggestions on field equipment, field methods of work, devices for keeping notes on maps, etc.; they are addressed to beginners in field-work, and to them should prove very valuable. Chaps. xxii and xxiii deal with some economic aspects of geological structures. They include such topics as: the search for coal, conditions under which coal occurs, the search for ores, general considerations which should guide the prospector, geological structure and engineering operations, reservoirs, underground water, springs, common artesian wells, and the distribution of disease in relation to geological conditions. Soils and subsoils are the subject-matter for chap. xxiv and the closing chapter, xxv, is devoted to a study of the relation of surface features to geologic structures.

Throughout the volume Mr. Geikie has limited himself to the more settled doctrines and principles of working geology, and has not attempted to present alternative views or possible objections. He has avoided the presentation of many of the problems now engaging the attention of structural geologists.

The photographic illustrations deserve special mention for their excellence, and among them the photographs of rock specimens are the most remarkable.

W. W. ATWOOD

The Viscous vs. the Granular Theory of Glacial Motion. By OSWIN W. WILLCOX. Long Branch, N. J.: Published by the author, 1906. Pp. 23.

This is less a treatment of the theme implied by the title than a review of a particular statement of one phase of the granular theory.[1] Even as a special criticism it goes wide of the mark, as the author, inadvertently it is to be assumed, substitutes easily demolished propositions of his own for those of the sponsors of the granular theory. As the leading feature of his discussion, Dr. Willcox attributes to the special sponsor he selects the unlimited proposition that "strictly crystalline minerals are incapable of manifesting viscous fluidity," whereas the real proposition is the very special one that "the retention of *its* crystalline structure," by the *ice granule*, during glacial *motion*, is incompatible with a *viscous flowage* of the granule. The "universal principle" thus substituted for the special proposition is attacked by the citation of the peculiar phenomena manifested by certain organic compounds, called, with more or less questionable propriety, "crystalline liquids" and "liquid crystals." These interesting phenomena have been all along known to some of the sponsors of the granular theory, presumably to all, and have awakened the question whether these "liquid crystals" are not short of being *typical liquids* to the extent that they are "crystalline," and short of being *typically "crystalline"* to the extent that they are liquids. The more vital question, however, is whether or not they *retain* their "crystalline" character while undergoing continuous and protracted motion under stress. Had these questions been sharply discussed, with full and critical data, the contribution would have been at least suggestive as to theoretical possibilities of beha-

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[1] Chamberlin, *A Contribution to the Theory of Glacial Motion*, University of Chicago Press, 1904.